Economics notes
Using cost effectiveness information

Andrew Briggs, Alastair Gray

This is the seventh in a series of occasional notes on economics

Health Economics Research Centre, University of Oxford, Institute of Health Sciences, Oxford OX3 7LF

Andrew Briggs
joint MRC/Anglia and Oxford Region training fellow

Alastair Gray
director

Correspondence to Dr Briggs

How should the results of economic evaluations be interpreted and used by decision makers in health care? In cost benefit analyses the decision rule is in principle straightforward: if benefits exceed costs then the programme should be implemented; if not, it should be rejected. However, the use of cost benefit analysis is limited by the need to place monetary valuations on health outcomes, and cost utility analyses are more widely used, with results presented in terms of the cost per QALY (quality adjusted life year).

Unfortunately, no clear decision rule exists for cost utility analyses. Some analysts have suggested setting a threshold value for the cost per QALY that represents the willingness of society to pay for additional QALYs. But others argue such thresholds could lead to uncontrolled expenditure growth if new procedures deliver QALYs at less than the threshold.[2]

Incremental cost per QALY figures are often grouped in league tables, which imply that interventions at the top (with lower cost per QALY figures) should take priority over those further down (see table). Many commentators have cautioned against the unthinking use of league tables because of non-comparability of methods, inappropriate comparators, and non-generalisability of results.[4] Even if these problems were solved, however, league tables would still need additional information to be useful to decision makers. In the original from which the table is constructed, Williams was considering whether the programme for coronary artery bypass grafting in the United Kingdom should be expanded.[3] Each figure in the table represents the incremental cost effectiveness[5] of bypass grafting compared with medical management: benefits declined as the programme was expanded to include patients with less severe disease. The incremental cost per QALY for bypass grafting for severe angina with left main vessel disease was 10 times less than for mild angina with double vessel disease.

This is an example of a changing marginal incremental cost per QALY. The importance of the margin is paramount in economic thinking. In the table marginal changes in the incremental cost effectiveness ratio take place at the "clinical margin"—that is, as the same intervention is expanded to cover individuals with less severe clinical disease. Age, sex, or risk factors could be seen as clinical margins when expanding programmes. For example, in a recent study of statin treatment for reducing cholesterol concentrations, the average incremental cost effectiveness for patients with pre-existing heart disease and a cholesterol concentration of >5.4 mmol/l was £32 000 per life year gained.[6] But this average hides differences in patient subgroups of £6000 to £361 000 per life year.

Ideally, a league table should include marginal incremental cost effectiveness data by having separate entries for different subgroups. The clinical margin has major implications for league tables: in the statin example the authors estimated 48 differing cost effectiveness figures for differing subgroups.

Besides the clinical margin, an intensity margin may also be identified. Interventions may be offered at different levels of intensity to the same patient groups—for example, annual or biannual breast screening, or low dose versus high dose antiviral therapy. Here the incremental cost effectiveness ratio must be calculated along this intensity margin: for example, in a breast cancer screening evaluation the analyst should be interested in comparing screening every three years compared with no screening, a two year compared with a three year screen, and a one year compared with a two year screen. To compare an annual screening programme with no programme will be misleading, as many of the benefits of an annual screen could potentially be achieved by a two year screen—that is, at a lower intensity point at the margin.

The implications for the "league table" approach are that data are required on patient subgroups at the clinical margin of the same intervention, and between the same patients at the intensity margin of an intervention. This requires more information about each margin. As many evaluations already provide subgroup analyses, a first step is to make better use of available information. The real choices are not about blanket exclusions but about assessing incremental effectiveness and costs at the margin.

An example of an incremental cost per QALY league table

Intervention	Cost per QALY
Pacemaker for atrioventricular heart block	£700
Hip replacement	£750
Valve replacement for aortic stenosis	£900
CABG (severe angina; left main disease)	£1 040
CABG (severe angina; triple vessel disease)	£1 270
CABG (moderate angina; left main disease)	£1 330
CABG (severe angina; left main disease)	£2 280
CABG (moderate angina; triple vessel disease)	£2 400
CABG (mild angina; left main disease)	£2 520
Kidney transplantation (cadaver)	£3 000
CABG (moderate angina; double vessel disease)	£4 000
Heart transplantation	£5 000
CABG (mild angina; triple vessel disease)	£6 300
Haemodialysis at home	£11 000
CABG (mild angina; double vessel disease)	£12 600
Haemodialysis in hospital	£14 000

CABG=coronary artery bypass grafting. Adapted from Williams[3]

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4 Gerard K, Mooney G. QALY league tables: handle with care. *Health Economics* 1993;2:59-64.
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6 Pharoah PDP, Hollingworth W. Cost effectiveness of lowering cholesterol concentration with in patients with and without pre-existing coronary heart disease: life table method applied to health authority population. *BMJ* 1996;312:1443-8.